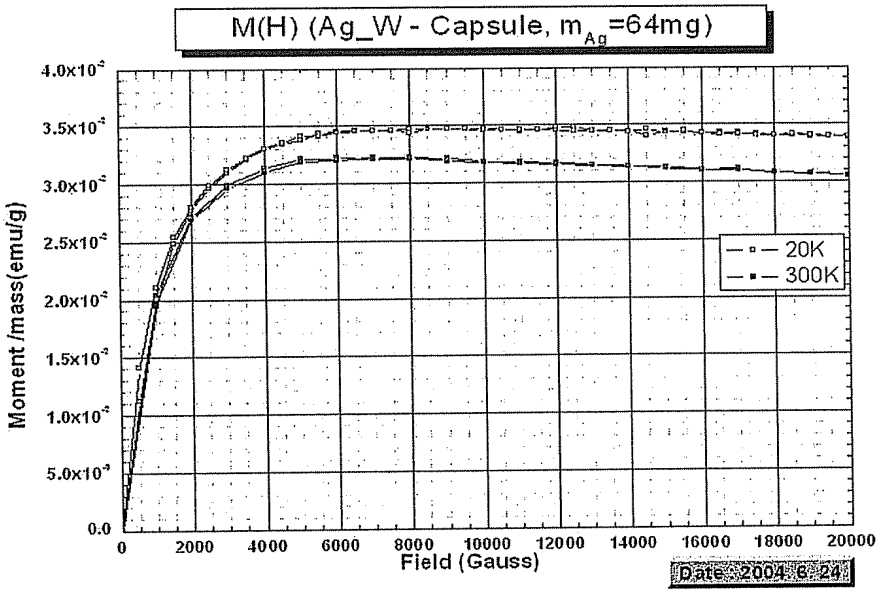
REMARKS

This application has been amended. Specifically, the limitations previously appearing in claims 44 and 47 have been incorporated into claim 31. Claims 40 and 43-49 have been cancelled. Accordingly, claims 31-39 and 41-42 are currently pending. Each of the pending claims has been amended to clarify that they are directed to a paramagnetic silver powder, which was the species elected (between silver and gold) in response to the Restriction Requirement of April 1, 2008. The Title has also been amended to more accurately reflect the subject matter claimed. Since support for each of the amendments can be found in the claims and specification as originally filed, no new matter has been added by this amendment.

Claims 31-39, 41-44 and 47 were rejected under 35 U.S.C. 103(a) for obviousness over U.S. Patent No. 6,153,348 to Kydd et al. (hereinafter, "Kydd") in view of U.S. Patent No. 6,264,801 to Hack et al. (hereinafter, "Hack") In light of the foregoing amendments and subsequent comments, Applicant respectfully traverses this rejection.

The present invention is directed to silver powder having paramagnetism at an absolute temperature of 20K or above. As seen in FIG. 10 of the application, reproduced below, the silver powder of the present invention has positive mass magnetization, or magnetic susceptibility, in the same direction as that of the external magnetic field in almost all magnetic field values at an absolute temperature of 20K or above. As evidenced by the positive (i.e. above zero) moment/mass value, the atoms of the silver powder align with the external field. Thus, the silver powder has a positive mass magnetization in an external magnetic field, H, of 4,000 Oe or greater.

FIG. 10—inventive silver powder

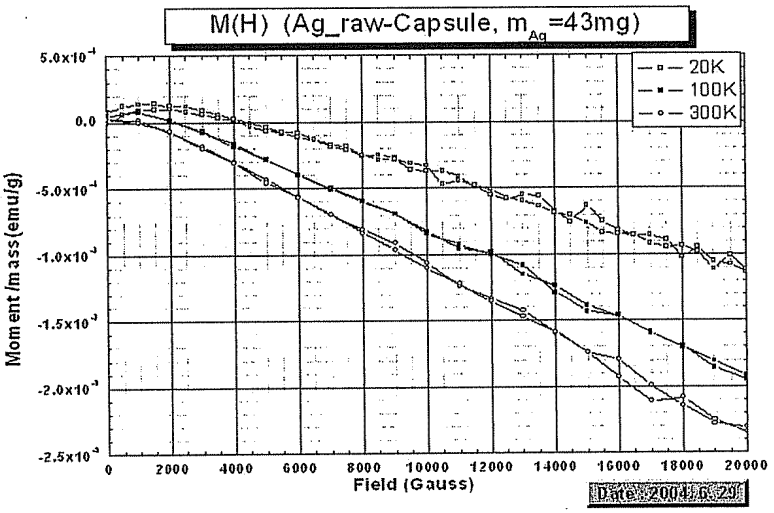


On the other hand, conventional silver powders are diamagnetic. (See, e.g., "Miscellaneous" section on page 2 of Wikipedia entry for "Silver," copy attached). Most elements in the periodic table, including silver and gold, are diamagnetic. (See NDT Resource Center article, copy attached) Diamagnetic metals have a very weak and negative susceptibility to magnetic fields. (Id.) Diamagnetic materials are slightly repelled by a magnetic field and the material does not retain the magnetic properties when the external field is removed. (Id.) Diamagnetic properties arise from the realignment of the electron orbits under the influence of an external magnetic field. (Id.) On the other hand, paramagnetic metals are slightly attracted by a magnetic field and have a small and positive susceptibility to magnetic fields. (Id.) Paramagnetism is due to the presence of some unpaired electrons and the realignment of the electron orbits by the magnetic field. (Id.)

FIG. 1 of the application, reproduced below, confirms that raw silver powder ("Ag_raw-Capsule") has a very weakly positive (i.e. close to but above zero) mass magnetization at an absolute temperature of 20K when subjected to an external magnetic field of 4000 Oe or less as well as at an absolute temperature of 100K in an external magnetic field of 2000 Oe or less. At temperature of 100K or 300K, the conventional silver powders have a magnetic susceptibility that is always negative when in an external magnetic field of 2000 Oe or more. When the magnetic field is between 2000 and 4000 Oe and the temperature is 20K, the mass magnetization value of the raw silver powder is positive, but

very weak. When the magnetic field is over 4000 Oe, the magnetic susceptibility (mass magnetization) of the silver powder at 20K becomes negative. The negative magnetic susceptibility confirms that raw silver is a diamagnetic material. Furthermore, as seen by comparing FIGS. 1 and 10 of the subject application, Applicant's inventive silver powder has a positive magnetic susceptibility in a magnetic field of 4000 Oe or above while the conventional raw silver powder does not.

FIG. 1—conventional silver powder



The Examiner contends that a paramagnetic silver powder having the magnetic properties recited in claim 1 would be obvious over Kydd in view of Hack. Applicant respectfully disagrees.

Kydd relates to metal particle liquid toners which include silver flake of approximately 5 μm. Kydd does not discuss the magnetic properties of the silver flake particles used therein. Presumably, the magnetic properties of the silver flake in Kydd are analogous to that of conventional silver, such as that used in Applicant's comparative examples. Hack is directed to a method of altering the magnetism of materials and the materials produced according to these methods. Specifically, Hack describes a process in which high voltage, high frequency sparks are applied to the surface of a material in order to alter the material's magnetic properties. In one embodiment, the high voltage, high frequency spark treatment is applied to diamagnetic silicon in order to produce ferromagnetic silicon. The spark process of Hack includes forming a magnetic thin layer having high

amorphization on the surface a silicon wafer by repeatedly generating sparks in a spark generating device. (Hack, col. 3, lines 27-63) That is, Hack relates to coating a substrate surface with an extremely amorphous thin film, which is generated in a series of vaporization-deposition reactions carried out by repeating a process of vaporizing and depositing some of the substrate materials using the spark process for a very short time. The resulting thin film has magnetism different from that of the bulk materials. Therefore, Hack relates to thin film fabrication, not powder fabrication, and is limited to transforming magnetism through the production of a thin film by generating a spark on a part of a conductor or semiconductor wafer surface.

A paramagnetic silver powder as defined in claim 1, as amended, is not described or disclosed in Kydd and Hack. Moreover, the paramagnetic silver powder of claim 1 cannot be easily derived from Kydd and Hack, whether these documents are considered alone or taken in combination. As mentioned above, Kydd is relevant only as disclosing silver flake particles having a size of around 5 μm. Kydd does not discuss or suggest that the silver flake particles have the magnetic properties of the silver powder defined in claim 1. Hack, relates to thin film fabrication, not powder production. Moreover, Hack does not describe a silver material (much less a powder) having the magnetic properties recited in claim 1.

The Background section of Hack describes diamagnetic materials as having atoms with no permanent magnetic moments. (Hack, col. 1, lines 25-26) When such a diamagnetic material is exposed to an external magnetic field, the external magnetic field induces a magnetic moment in each atom that is opposite the external magnetic field. (Hack, col. 1, lines 26-30) On the other hand, paramagnetic materials have atoms with a small magnetic moment and, when an external field is applied, the moment of each atom tends to align with the external field. (Hack, col. 1, lines 35-39) Hack goes on to list silver as an example of a paramagnetic material in lines 13-16 of column 3. However, Hack does not actually verify that silver is paramagnetic, and this classification appears contrary to both the common definition of silver as a diamagnetic material and the results displayed in Applicant's FIG. 1 showing silver to exhibit diamagnetic properties, as discussed above. Moreover, Hack does not describe the particular mass magnetization or coercive force properties present in the silver powder of claim 1. In addition, Hack does not discuss silver

powders or methods of transforming the magnetic properties of silver powders. Instead, Hack only discusses a technique that forms a magnetic thin film.

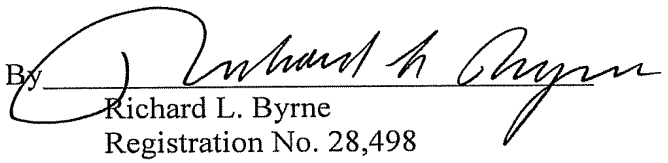
Raw silver powder has a negative susceptibility (mass magnetization) in an external magnetic field of 4000 Oe or more at temperatures of 20K, 100K and 300K. (See FIG. 1) The paramagnetic silver powder of the present invention has positive susceptibility (mass magnetization) in an external magnetic field of 4000 Oe or more at temperatures of 20K, 100K and 300K. (See FIGS. 10-13) As amended, claim 31 specifically defines a paramagnetic silver powder that has magnetic properties not present in a raw silver powder. Even assuming that Hack correctly defines silver as a paramagnetic material, which Applicant denies in view of the abundance of evidence to the contrary, the specific magnetic properties of the claimed silver powder are distinct from the properties of the silver materials of the prior art.

With respect to claim 37, it is further submitted that the conventional silver powder has a saturated magnetic moment in an external magnetic filed of 2000 Oe or less at 100K or 300K. On the other hand, the paramagnetic silver powder recited in claim 37 has a saturated magnetic moment in an external magnetic field of 2000 Oe to 8000 Oe at 100K or 300K.

As described above, the silver powder according to the present invention is paramagnetic as this term is generally understood, while conventional silver powder is diamagnetic. In addition, claim 31, as amended, defines a paramagnetic silver powder having specific magnetic properties which are different from the magnetic properties of conventional silver powder, as evidenced by Applicant's data comparing the magnetic properties of traditional raw silver powder with the paramagnetic silver powder of the present invention. Moreover, the definition in Hack of silver as a "paramagnetic" compound is inconsistent with the common understanding that silver is, in actuality, a diamagnetic material. In addition, Hack fails to suggest or even mention a silver material having the specific magnetic properties recited in claim 1 which, considering that the recited properties are clearly not inherent in conventional raw silver (as supported by Applicant's data), is a significant deficiency in the Hack patent that has not been explained.

For all the foregoing reasons, Applicant respectfully submits that the pending claims are patentable over the prior art of record and are in condition for allowance. Reconsideration of the rejections and allowance of pending claims 31-39 and 41-42 are respectfully requested.

Respectfully submitted,
THE WEBB LAW FIRM

By 

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